The Acorn Archimedes

Our resident alternate microprocessor architecture guru, Roy Hill, is impressed with the latest offering from the makers of the BBC (but he's not ready to buy!).

THE LONG-AWAITED Acorn Archimedes has finally arrived! If you've read my recent articles in YC on the Novix chip and the Transputer, you'll have realised that I'm highly interested in the technological advances being made in the area of alternate microprocessor architectures. Here, at last, is a chance to see whether the goods are being delivered, or whether it's all just sales and backroom hype.

The Archimedes was delivered in two large boxes — the system unit in one box and the monitor (they seem to get heavier and heavier) in the other. I opened the system unit and my first impression was that a lot of thought had gone into the presentation of the machine. The manuals were in their own individual compartments and not just thrown into the bottom of the box. In fact, I have become used to assembling, installing and testing machines with no instructions at all. The review machine supplied was the Model 310, which contains 1 megabyte of RAM, plus 240 bytes of battery-backed CMOS RAM, 512 Kbytes of ROM and an 800 Kbyte 3½ inch floppy drive.

The system unit is extremely light — so light, in fact, that my 12 year old daughter Janelle was able to handle it with ease. I am used to hefty machines with hefty power supplies (and hefty price tags), so this was quite a surprise. The keyboard is an (almost) IBM extended type. The difference is in the last row of keys on the numeric keypad. And this was where the first minor irritation arose: the plug for the keyboard is one of the newer 'IBM Mini' styles and is located in the lower front recessed portion of the system unit. Full marks for placing it in the front, deduct 10 for making it so hard to get to.

I had to get down on my hands and knees in front of the unit, with a pencil torch in my mouth, to plug in the keyboard. I guess this isn't a major hassle, as one wouldn't need to remove the keyboard often, but it did take about 10 minutes to install it properly. The function keys (12 of them) are red, which is a remnant from the old BBC machine, also made by Acorn. Note the adjustable plastic prompt card window, which contains a replaceable, application specific card — very handy.

The Archimedes is also supplied with a three button mouse which plugs into the keyboard — the left button selects, the middle one brings up an appropriate menu and the right is used to alter. An excellent feature is that the menus pop up at the cursor location rather than at the top of the screen.

The monitor, which carries the Archimedes logo, is a Taiwanese RGB and is quite hefty. It took Janelle and myself quite a bit of juggling to take it out of its box. It was here that a *big* fault appeared. The makers had placed it inside a fairly thin polythene bag, which was obviously not static proofed. As I removed the bag from the monitor, the hairs on my arms fairly stood on end.

This served as sufficient warning to take more than normal care, so I connected the

signal cable (a bit too short for my liking) to the monitor and held it against an earthed power supply I had on my workbench. Sure enough, a 20 kV (plus) spark jumped from the pins to the case of the supply. I can only speculate on what would have happened if I'd connected it directly to the Archimedes.

The power cables for both the Archimedes and its monitor are the new triangular (IEEE) style and the monitor plugs into an outlet in the system unit. A 10-point bonus here — both the monitor and the keyboard plugs (both male fittings) were provided with dust covers. The mouse came in its own little dustproof plastic bag, so once again, some thought has obviously gone into presentation.

The model I received for this review was one level above the base grade model and only had an 800 Kbyte floppy installed. The only software supplied with the machine is a Welcome Disc; any application programs will cost extra. Basic is provided both in ROM and as a RAM executable floppy file, and is quite adequate. The floppy drive is located on the front right of the system unit, and the whole section is tilted upwards at an angle of about 10 degrees, which makes inserting a floppy that much easier. The floppy drive also comes with a yellow plastic head protector, which is used to prevent any shipping damage.

Documentation

At this stage, I thought it wise to consult the manuals, as I was about ready to fire up. There are two manuals provided, a Welcome Guide and a User Guide (which is really the Basic Reference Manual). Both manuals are well laid out, and in most cases easy to follow. The manuals are as good as most I've seen, but still fall short of what I consider to be appropriate.

A Music Editor program is provided with the Welcome Disc. The instructions in the manual are sufficiently vague to make it necessary to experiment before it becomes clear just what the documentation means. Also, several functions didn't work as expected, and when I tried to save part of a small piece of music, the machine just *beeped* at me rather unhelpfully. There was no error message, and nothing in the manual either. I must have half expected this, as I had only entered 5 or 6 bars before trying to save it. I contacted the distributor, who promised to send me an updated Welcome Disc (I'm still waiting for it!).

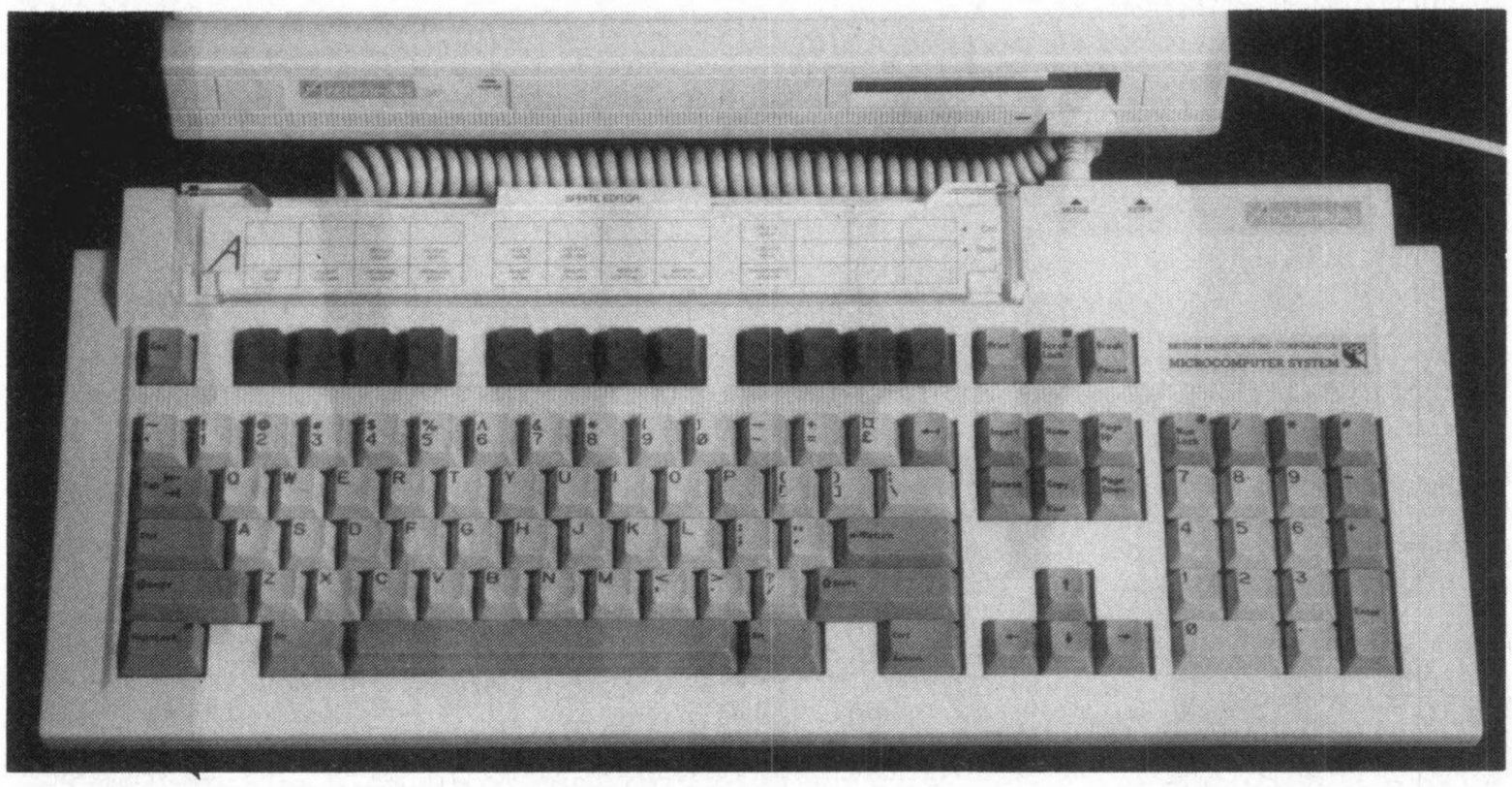

Figure 1. *The keyboard is similar to that of an IBM AT — the red function keys are a remnant of the old BBC Model B. Note the adjustable plastic prompt card window, which contains a replaceable, application specific card.*

Lander

The disc also contains several other small applications programs, as well as a game called Lander. I had seen this game demonstrated at a sneak preview of the Archimedes, back in September and was anxious to obtain 'expert' assessment of it. My three children — Cameron, Andrew and Janelle — are all game experts, having conquered Sammy Lightfoot, Archon and Donkey Kong on the Apple. They were unanimous in their assessment of Lander — the graphics are incredible!

I think they would have preferred to use it with a joystick, but the mouse was acceptable. In fact, the mouse is one of the best I've used. It was both highly sensitive and speedily responsive. No over running or undershooting — a pleasure to use.

The power of this machine is evident in the game — the 'lander' is a 3D figure with full rotation and tilt. It travels over a real time 3D landscape, drawn in 16 colours, using fuel (every time you boost the lander a multi-coloured ion stream is ejected) and destroying objects (which explode in multi-coloured particles). The landscape has contours and other geographic features, as well as a seascape. Pretty impressive, eh? Would you believe me when I tell you that it runs in interpreted Basic? Indeed it does — so does the window manager program. If anyone disbelieves that RISC-based computers can give standard Von Neumann processors a caning, let him try Archimedes. Other software on the Welcome Disc provides a Notepad, Calendar and Paint function. All of these worked as expected.

I/O

The rear panel of the system unit is fairly bristling with I/O facilities, including a 32 ohm outlet for stereo headphones, a mono (composite) video adapter, the CGA adapter, the RS423 serial port, the Centronics parallel port, the Econet networking port and the power inlet and switch. At the top left hand side of the rear panel can be seen the two 'podule' expansion units. These can be used for adding anything from a second processor card to a networking adaptor. However, it is unlikely that Acorn will be swamped with calls from manufacturers desperate to produce 'podule units,' so Archimedes purchasers will probably have to rely on the boards that Acorn themselves produce.

Opening the system unit is a fairly trivial matter — it has to be, as the battery backed clock takes 2 AA sized alkaline batteries. (I am at a loss to explain why Acorn didn't opt for either Lithium cells or Nicads which last much longer. Acorn seem to have really tried to perform well on presentation but have missed out on several details like this.) There are three screws located at the top of the back panel and one on each of the front side panels. With these five screws removed, the top simply slides to the rear.

This exposes the fairly sparsely populated interior, which in the unit I evaluated only contained the motherboard, the floppy drive and the power supply. The latter is fairly interesting in that it supplies power to the motherboard via a series of spade lugs, rather than a polarised power connector. (Anyone removing the motherboard from the system unit had better

make a good note of which connector goes where.) The power supply is one of the switched mode variety, which helps explain the low weight of the system unit. It has plenty of reserve connectors for adding podules and a hard disc.

The Motherboard

The first thing of note about the motherboard is that Acorn have placed all the normal 'glue' logic inside PALs (Programmable Array Logic). There are three of these (aside from the ARM processor itself), with the fascinating names of Anna, Albion and Arabella. They all bear the Acorn label, so were evidently made for Acorn by an Asian firm (Acorn are now part of multinational Olivetti). The operating system and Basic are stored on the four ROMS in the rear right of the board; they are labelled ARTHUR1 through ARTHUR4 (obviously Acorn have 'seeded' this board with the letter A.)

The ARM (Acorn RISC Machine) processor is the biggest of all these chips and is located underneath the floppy cable. The chip is a 32-bit, 8 Mhz RISC (Reduced Instruction Set Computer) based processor. In this case, clock speed is not a valid indicator of processor performance. It is quite possible to have an 8 MHz RISC processor running at 10 to 15 MIPS (Million Instructions Per Second). To give an idea of the speed, Acorn claim 4901 Dhrystones/second (a measure of computing 'efficiency') for the A310 model, while quoting 458 for an IBM AT and 3748 for a Compaq DeskPro 386.

This is another advantage of using CMOS RISC processors and gate arrays. They consume less power and thus run cooler. In the centre right of the board is a huge 3 x 32-pin connector, which I can only assume is provided for podules. There are several other connectors dotted around the board, so at least Acorn seem to have designed this machine with the future in mind.

Software and the Operating System

As I mentioned earlier, BBC Basic is provided in ROM and as a disc file, and is fully described in the Basic Reference manual (part of the User Guide). As one would expect, it contains all standard Basic commands, as well as those necessary to address I/O devices, including direct addressing of screen locations and disc files. The Reference Manual is 490 pages long and covers most of the commands reasonably well. An exceedingly brief summary (just enough to be dangerous) of operating system commands is given in Appendix C and the I/O call summary in Appendix D.

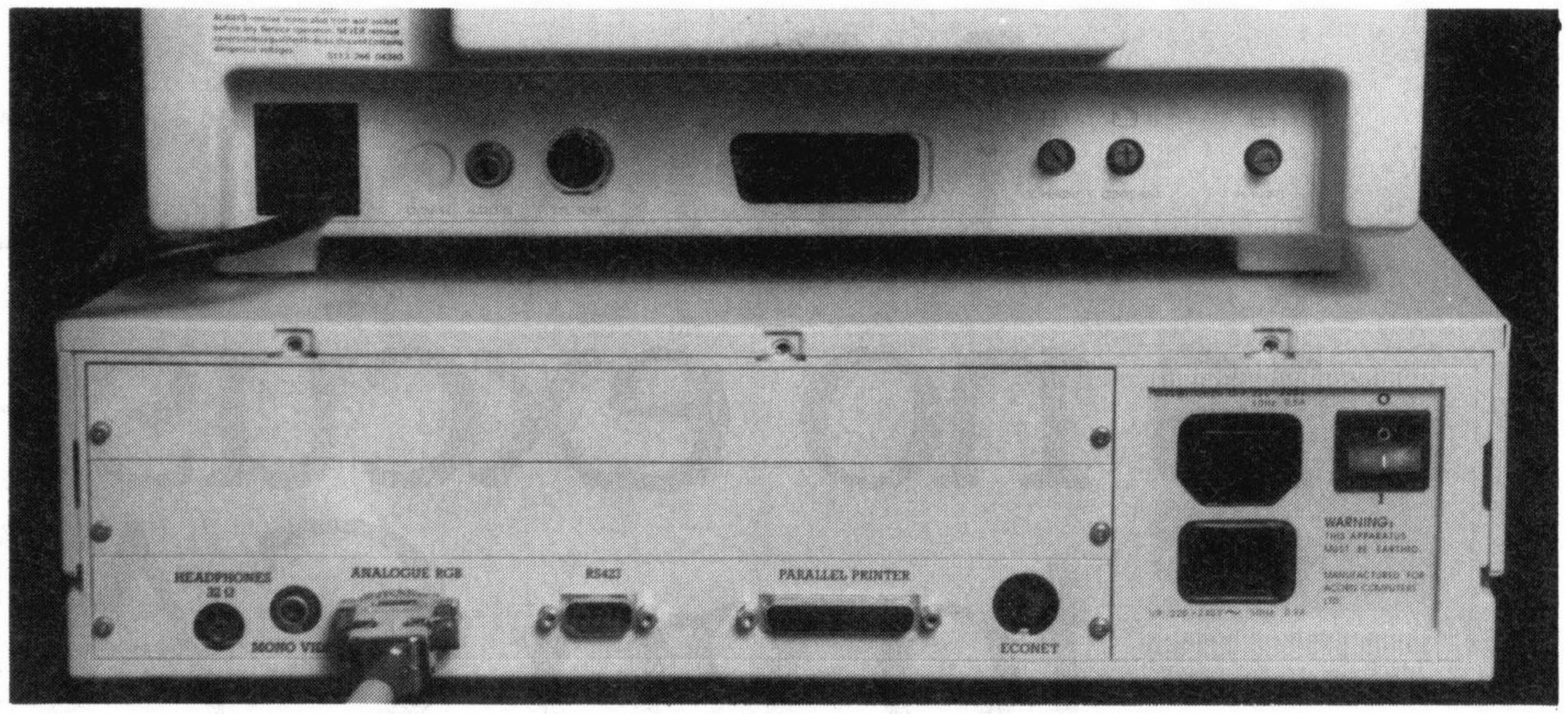

Figure 2. The rear panel of the system unit with a 32 ohm outlet for stereo headphones, a mono (composite) video adapter, the CGA adapter, the RS423 serial port, the Centronics parallel port, the Econet networking port and the power inlet and switch. At top left hand can be seen the two podule expansion units.

I have a big complaint about the I/O commands — they all commence with the '*FX' prefix, followed by one or more numerical parameters. They make no attempt to be mnemonic so that the system programmer will have to keep the reference manual close by whilst writing programs. System level work is difficult enough, without having to continually refer to a manual for command syntax.

Other software stored on the Welcome Disc includes '65Arthur,' which enables the Archimedes to run existing BBC programs, FPEmulator (a floating point emulator used by compilers), WIMP and RAM Basic, neither which worked due to a 'System reported error. No room in RMA.' No explanation in manual, either. I think a little more work is required in the documentation department. In fact, none of the files worked as I would have expected.

As mentioned above, I contacted the Australian agents for the machine who promised to send me an upgrade disc that fixed these various bugs but since that was never forthcoming, I can only guess that it does as promised. If their 'before sales service' is that slack, I can't help but wonder what it's like after you've handed your money over.

Summary

At the price of the Model 310 Archimedes, would I buy it? Well I think I'd wait just a little while, until the promised MS-DOS podule with an 80186 is available and then I'd probably be in the market. The MS-DOS podule promises IBM compatibility, so one could have the best of all worlds. In my opinion, processors like the 80xyz, 68abc and 32efg have had their day. The Archimedes (and the Amiga, which is reputed to be coming out with a transputer as its processor), plus the Novix Forth chip are examples of RISC type processors and I am sure this is the processor of the future. Also, I have my doubts about the supplier coming to the party with upgrades once the mandatory warranty period expires, given their sluggishness in responding to my request for additional information and the bug free Welcome Disc. □

Product Details

Product: The Acorn Archimedes
From: Acorn Computers Ltd, Cambridge, England
Distributor: Barsons Computers, 335 Johnston St, Abbotsford 3076 Vic. (03) 419 3033
Price: $800 colour monitor
$2495 Archimedes 305 system unit
$2750 Archimedes 310 system unit
$5795 Archimedes 410 system unit with 1 Mbyte RAM, expansion back plane, 20 Mbyte hard disk, and colour monitor
$9000 Archimedes 440 system unit with 4 Mbyte RAM, expansion back plane, 20 Mbyte hard disk, and colour monitor
$1805 20 Mbyte hard disk and podule for 300 series only
$452 3½ inch floppy disk drive
$3895 1 Mbyte RISC-based applications card for PCs and compatibles.
All prices untaxed.